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(REV 11-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

876.0002.U1(US)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

10/069334 ✓

INTERNATIONAL APPLICATION NO.

PCT/FI00/00708 ✓

INTERNATIONAL FILING DATE

21 August 2000 ✓

PRIORITY DATE CLAIMED

31 August 1999 ✓

TITLE OF INVENTION

Content Filtering in a Gateway of a Wireless System ✓

APPLICANT(S) FOR DO/EO/US

RAUTIAINEN, Aapo ✓

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☐ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☒ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☐ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☒ Certificate of Mailing by Express Mail
23. ☐ Other items or information:

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

10/069334

INTERNATIONAL APPLIC. NO.

PCT/FI00/00708

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24. The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

- ☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1040.00
- ☒ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00
- ☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00
- ☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00
- ☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =

\$890.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).

\$0.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	11 - 20 =	0	x \$18.00
Independent claims	3 - 3 =	0	x \$84.00

\$0.00

\$0.00

Multiple Dependent Claims (check if applicable). ☐

\$0.00

TOTAL OF ABOVE CALCULATIONS =

\$890.00

☐ Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.

\$0.00

SUBTOTAL =

\$890.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).

\$0.00

TOTAL NATIONAL FEE =

\$890.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). ☒

\$40.00

TOTAL FEES ENCLOSED =

\$930.00

Amount to be:

refunded

\$

charged

\$

- a. ☒ A check in the amount of \$930.00 to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 50-1924. A duplicate copy of this sheet is enclosed.
- d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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32,493

REGISTRATION NUMBER

February 20, 2002

DATE

Content filtering in a gateway of a wireless system

The present invention relates to a gateway that connects a wireless network and the Internet network enabling the bringing of a content from the Internet network to a wireless terminal. The invention relates in particular to the filtering of a content in a gateway of the WAP system (Wireless Application Protocol).

Wireless communication networks and the Internet network are expanding rapidly and the number of their users is increasing. Bringing Internet contents and advanced data services to digital mobile stations, so-called media phones, is possible, e.g. with the help of WAP engineering or Smart Messaging engineering presented by Nokia. Although, hereinafter in this description, the WAP system will be used as an example, the explanation also relates to other similar systems (Nokia Smart Messaging, etc.) the duty of which is to bring Internet contents to wireless terminals. The contents brought to wireless terminals with the help of WAP engineering are called by the common noun of WAP content. WAP engineering utilises parts of the existing standards. Furthermore, it comprises own solutions optimised for wireless networks. The intention is to globally support as many wireless digital telecommunication networks as possible. Because the WAP system was developed only recently and because, in some cases, only frameworks for different implementations are defined in the WAP system specifications, there are no known solutions for the implementation of certain parts of the system.

The WAP system is based on the co-operation of three different components: a WAP terminal 10; a WAP gateway 11; and an origin server 12 (Figure 1). Respectively, the Nokia Smart Messaging system comprises a gateway, in between a terminal and an origin server, one product version of which is called Nokia Artus Messaging Platform. For browsing WAP contents, a user has the wireless WAP terminal 10, which comprises a WAP browser as the user interface, a so-called micro browser or some other WAP application that functions in a WAP terminal. As such, the WAP terminal 10 can be just any device that uses WAP protocol for external communication. The WAP browser is analogous with a web browser.

When the user wants to get a certain WAP content to his terminal, an efficiently encoded request 13 will go along the radio path first to the WAP gateway 11. The

WAP gateway that comprises means for encoding and decoding is capable of transforming information that is according to WAP protocol, e.g. Internet protocol, into information that is according to HTTP protocol (HyperText Transfer Protocol), and vice versa. After getting from the WAP terminal 10 the above-mentioned
5 request, the gateway 11 transforms it into a request 14 that is according to Internet protocol and sends it to the origin server 12, wherein the desired WAP content is located.

The WAP content, obtained from the origin server 12 as a response 15 to the
10 request can be, e.g. a WML (Wireless Markup Language) document or a WML-Script document, is sent to the WAP gateway 11, which transforms the information according to Internet protocol into information according to WAP protocol, e.g. WSP protocol. In a gateway of the Nokia Smart Messaging system, e.g. an HTML (Hyper Text Markup Language) document is respectively transformed, e.g. into a
15 TTML (Tagged Text Markup Language) document. Further, the gateway 11 sends 16 the WAP content efficiently encoded for the radio path, to the user's WAP terminal 10.

It should be noted that typically, there are in between a WAP gateway and a radio
20 interface, e.g. in the GSM (Global System for Mobile communication) network, a number of elements. Typically, these are devices that are located, e.g. in a mobile services switching centre, in a base station controller or a base transceiver station. The WAP gateway may physically be located, e.g. in a corporate data network. It is typically implemented by a computer program that can be run, e.g. in a
25 Windows NT workstation. The WAP gateway can be connected, e.g. to a GSM network mobile services switching centre or short message service centre. Thus, the WAP gateway can be considered to be functionally in connection with the radio interface.

30 The limited data transfer capacity of a wireless network and the features of a wireless WAP terminal (e.g. mobile station, cellular radio network mobile phone), such as a small-sized display and limited storage space place restrictions on the WAP content to be retrieved from the Internet network to the WAP terminal. Typically, the WAP content to be retrieved to the WAP terminal from the Internet
35 network is not, in this case, suitable as such for being viewed by a user but typically, the content must be processed on several different occasions before it is transferred over the air interface on to the radio path. In other words, information

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that is unnecessary from the viewpoint of the wireless WAP terminal is typically removed from the content. This filtering of the content preferably takes place in the WAP gateway. In the WWW (World Wide Web, Internet), on the basis of which the WAP system was built, the processing of the content typically takes place at the end of the network browser, if any processing is required at all. In the WAP system, the processing of the content in the WAP browser of a wireless terminal is not possible in practice due to the limited storage space. And because there is a shortage of frequency bands used for data transfer in a wireless network, sending unnecessary information on to the radio path would not indeed be sensible.

Therefore, a flexible and efficient solution is needed for filtering each different content type in the WAP gateway. Different content types are, e.g. WML pages. WML-Script, MIME Multipart (Multipurpose Internet Mail Extensions), HTML pages and Error pages, as well as other content types defined in the WAP specifications.

The solution must be flexible, because it must be possible to add new filters to the WAP gateway, always when new content types appear. The solution must be efficient, because the data transfer capacity of the radio path is limited and because all the numerous requests that come from WAP terminals go through the WAP gateway.

It is possible to use for filtering a filtering mechanism, where all filtering stages are embedded in a single filter. However, this would reduce the flexibility of the system. For example, replacing the WML encoder used at the filtering stage of a WML page with a more efficient encoder would demand significant changes to be made in the system.

Now, a flexible and efficient solution has been invented for filtering a WAP content. There is provided a method for filtering messages in a gateway, which gateway receives and processes a first message that comes from a wireless terminal and which gateway retrieves a second message from an origin server and supplies it to the wireless terminal, and said first and second messages belong to a specific message type of a set of message types known to the gateway. It is characteristic of the method that it comprises:

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determining for each message type known to the gateway, a filter chain that determines the filters for filtering a message that belongs to respective message type, which filters have a specific order in the filter chain;

receiving a message into the gateway;

- 5 determining the message type of the message that arrived at the gateway; filtering said message in the filters of the filter chain, which filter chain is defined for the message type of said message, in the order that is determined in the filter chain in question.

- 10 According to the invention there is provided a gateway which gateway comprises a specific set of filters of which each filter is arranged to carry out specific filtering for filtering messages in the gateway;

means for receiving and processing a first message that comes from a wireless terminal;

- 15 means for retrieving a second message from an origin server and for supplying it to the wireless terminal; and which said first and second messages belong to a specific message type of a set of message types known to the gateway. It is characteristic of the gateway that it comprises:

- 20 means for determining the message type of the message that comes to the gateway;

means for determining a filter chain for each message type, which filter chain is arranged to filter the message by directing it, in a specific order, through specific filters in the filter chain, depending on the message type.

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According to the invention there is provided a computer program product that can be executed by means of a computer, for filtering messages in a gateway according to the invention, which computer program product comprises:

- 30 a computer program code for implementing a specific set of filters, of which each filter is arranged to carry out a specific filtration, for filtering messages in a gateway;

a computer program code for receiving and processing a first message that comes from a wireless terminal;

- 35 a computer program code for retrieving a second message from an origin server and for supplying it to the wireless terminal;

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and which said first and second messages belong to a specific message type of a set of message types known to the gateway. It is characteristic of the computer program product that it comprises:

- 5 a computer program code for determining the message type of the message that comes to the gateway;
- a computer program code for determining a filter chain for each message type, which filter chain is arranged to filter the message by directing it, in a specific order, through specific filters in the filter chain, depending on the message type.

- 10 According to the invention, a filtering mechanism based on a filter chain is used in a WAP gateway. Several different filter chains are defined for the WAP gateway, one for each content type. A content with the headers that arrives from the Internet network to the WAP gateway is filtered in a filter chain defined for the content type in question. Each filter of the filter chain performs in turn a specific
- 15 task for the content, where the content and/or the headers that come along with it are edited to make them suitable for the transfer to a wireless WAP terminal, carried out along the radio path.

- 20 In the following, the invention will be explained in detail by referring to the enclosed drawings, in which

- Figure 1 shows a model of the WAP system;
- 25 Figure 2 shows parts of a WAP gateway that are related to the processing of requests that arrive from WAP terminals;
- Figure 3 shows a preferred embodiment of filtering a WAP content according to the invention;
- 30 Figure 4 is a flow diagram that shows a decision-making process in a response filtering unit according to the invention; and
- Figure 5 illustrates the positioning of individual filters in different filter chains according to the invention.

Figure 1 was explained above in connection with the explanation of prior art. Figure 2 shows parts of a WAP gateway that are related to the processing of requests that come from WAP terminals along the radio path. The request mentioned here can be, for example, a request for retrieving some WAP content, e.g. a WML document that contains railway guide information, from an origin server in the Internet network, to a WAP terminal.

- COMM 20 (Communication interface) is in a WAP gateway an interface over which messages, e.g. a request according to WSP protocol or a so-called push request that have come from WAP terminals to a WAP protocol stack 25 of the gateway, are transferred from the protocol stack to a request handling unit 21. The gateway's WAP protocol stack (WPS) 25 comprises protocols for communication between the gateway and a WAP terminal. These are not shown in the figure.
- 15 The request handling unit 21 is preferably a so-called run time unit. It is a computer program, which can be run alone but which alone performs nothing sensible. In other words, it needs around it other computer programs or parts of a computer program in order to operate sensibly, as will be presented next.
- 20 The decoding of a request that comes from a WAP terminal and its changing into a format that is understood by the gateway logic is carried out in a request filtering unit 22, which is hidden behind a request filter façade. The program logic checks what kind of request it is a question of, i.e. the message type of the request in question is checked. The filtering of the request comprises slightly different kinds of stages depending on whether the request is of the message type of, e.g. an
- 25 ordinary WSP request or a push request. If it is a question of a normal WSP request, the request will go through the filter chain determined for a WSP request, if again it is a question of a push request, the request will go through the filter chain determined for a push request. Each filter of the filter chain performs in turn
- 30 a specific task for the request, which may be related, e.g. to the decoding of the request. After the filtering of the request, the filtered request will be returned to the request handling unit 21.

- Typically, the desired WAP content is retrieved from the Internet or Intranet: from an origin server 23, to a WAP gateway over a content source façade. This will
- 35 take place as a result of a request made by the request handling unit 21 to the content source façade.

- When the message that comprises the desired WAP content arrives from the origin server 23 to the gateway, the request handling unit 21 directs the content and headers relating thereto to a response filter façade in a response filtering unit
- 5 24. The response filtering unit 24 carries out the filtering of the content and the headers relating thereto for the radio path. In the gateway, there is a set of filter chains defined for the response filtering unit 24, one for each content type. The filter chain to be used for filtering is selected on the basis of the content type. Each filter of the filter chain performs in turn for the request a specific task that is
- 10 typically related to the filtering of the content for the radio path. The filtered content with its headers is returned to the request handling unit 21, which uses the COMM interface 20 for returning the response to the WAP protocol stack 25 from which the response will be forwarded along the radio path, to a WAP terminal.
- 15 In order to better bring out the basic idea of the invention, the response filtering unit 24 is shown in more detail in Figure 3. It illustrates a filter chain 31 – 35 that is used for the filtering of a WAP content, which WAP content in this explanatory case is a WML page, i.e. in this explanatory case, the content type is WML.
- 20 When the desired WAP content (WML page) with its headers arrives from the origin server 23 to the gateway, the request handling unit 21 consequently directs it and the headers relating thereto to a response filter façade 30 in the response filtering unit 24. The response filter façade 30 now studies from the headers sent with the WAP content, what the content type; message type, of the content is.
- 25 This is done by studying the content type field of a header. When the content type is WML, the content type field typically reads "text/x-wap.wml". From this, the response filter façade 30 concludes that the content is a WML page and makes it go through the filter chain 31 – 35, defined for the WML content type.
- 30 Filter chains are defined in a configuration file of the gateway, wherein symbolic names are used for the filters. The filter chain WML_Chain, defined for the WML content type, preferably comprises the following filters: UAProf 31 (User Agent Profile); WML_Encoder 32; Range_Filter 33; Header_Filter 34; Header_Encoder 35. In addition to this, the filter chain WML_Chain may also include other filters.
- 35 Each filter 31 – 35 of the filter chain performs in turn, in sequence, some simple task in the filtering of the content.

In the example shown in Figure 3, the WML content with its headers is filtered first in the filter UAProf 31, which carries out for the content the changes required by the User Agent Profile of the WAP terminal that sent the request. Changes are needed because WAP browsers that function in different WAP terminals may, e.g. support different WML versions (e.g. Version 1.0 or 1.1).

At the second stage, the WML content (WML page) is efficiently encoded for the radio path in the filter WML_Encoder 32. The encoding may take place, e.g. according to the specification; Binary XML Content Format Specification, defined by the WAP Forum. The specification in question is part of the definition of the WAP protocol version 1.1.

If the WML page requested by a user's WAP terminal is so big that the data transfer protocol cannot transfer all the data in one go, the WAP terminal can make a WAP request that corresponds to the range request of the HTTP protocol version 1.1. In this case, the WML page (and the related images, sounds, etc.) are sent to the WAP terminal in parts. For example, first the bytes 0 – 999 can be requested, then the bytes 1000 – 1999, and so on. The third filter, Range_Filter 33, selects from the page encoded by the WML_Encoder, the requested byte link.

In the fourth filter (Header_Filter 34) of the filter chain WML_Chain, certain headers that have accompanied the WML page and are unnecessary from the viewpoint of the WAP terminal, are removed. These are, among others, Connection headers defined in the HTTP protocol version 1.1. The headers are attached to the WML page in the text format, wherefore their identification takes place by comparing them with the headers known to the gateway.

In the fifth filter (Header_Encoder 35) of the filter chain, the header of the WML page is efficiently encoded for the radio path, into a header according to WSP protocol. Encoding is based on the WSP protocol version 1.1, defined by the WAP Forum. In encoding, headers that are in the text format are replaced by bytes defined in the WSP specification. After this, the WSP content with its headers is returned to the request handling unit 21. The filtered WAP content is sent through the radio path to a WAP terminal, e.g. to a mobile station. In the WAP browser of the mobile station, the WAP content is displayed on a display. In the mobile station, the content does not have to be processed any more by filtering.

Similar filter chains are also defined for the response filtering unit as for the other content types. Also for the request filtering unit, filter chains are defined for a normal WAP request (WSP request) and a push request, in a similar manner.

- 5 One filter may belong to more than one chain. One and the same filter may also belong to filter chains used in both request filtering and response filtering. Each WAP content is only filtered in those filters that are necessary exactly for the content type in question.
- 10 The program code, the running of which in a computer will implement the functionality according to the invention, can be programmed, e.g. in some object programming language, preferably Java programming language.

Filter chains and the filters that belong thereto are defined in a configuration file.

- 15 Typically, the configuration file comprises rows, wherein the name of a filter chain and the filters that belong thereto, in the order of filtration, are determined by symbolic names. The row that determines the above-mentioned filter chain WML_Chain may look, for example, as follows:

- 20 WML_CHAIN=UAPROF:WML_ENCODER:RANGE_FILTER:HEADER_FILTER:HE
EADER_ENCODER;

Here, WML_CHAIN is the symbolic name of the filter chain to be used for filtering the WML content. UAPROF is the symbolic name of the first filter to be

- 25 implemented, WML_ENCODER is the symbolic name of the second filter to be implemented and so on.

The correspondence between the symbolic names and the actual Java classes is also defined in the configuration file. The Java classes are taken into use when

- 30 the WAP gateway is initiated, whereupon from the Java classes, objects; instances of the class, are created which in fact act as filters in the filter chain.

- 35 Figure 4 is a flow diagram that illustrates a decision-making process according to the invention in the response filtering unit 24 of a WAP gateway. In the gateway, the content types are classified as known and unknown types. Known content types are, among others, WML, WML-Script, MIME Multipart, HTML, and Error pages, as well as other content types defined in the WAP specifications. When

the desired WAP content with its headers arrives from an origin server to a gateway (block 41), a request handling unit directs it and the headers related thereto to a response filter façade in a response filtering unit. The response filter façade now determines from the headers sent with the WAP content, what the content's content type is (42). If the content type is known, a filter chain that is defined for the content type in question will be used for filtering the content (44). If again the content type is unknown to the WAP gateway, the WAP content is allowed to pass through a binary filter, which will not touch the content itself, but only filters the headers (45).

In both cases, the filtered content is directed to the WAP protocol stack of the gateway and from there further to the WAP browser of a user's wireless WAP terminal, with the help of normal WAP routines (block 46).

A filtering mechanism based on a filter chain provides for filters to be easily concatenated and, therefore, supports the upgrading of the different components. If a new content type appears it is easy to define, in the configuration file, a filter chain for the new content type, which it will go through. The filter chain concept also provides an efficient way to filter a WAP content, because each WAP content only goes through those filters that are necessary exactly for the content type in question.

Figure 5 illustrates the positioning of individual filters in different filter chains, in an imaginary case. Let us assume that a gateway comprises a program code, wherein filters AA, BB, CC, DD, EE, FF and GG are implemented. Let us further assume that the gateway knows three different content types for contents than arrive from the Internet (response) for the filtering of which filter chains K, L and M are used. In addition, the gateway knows two request types for requests that come from a WAP terminal, for the filtering of which filter chains P and R are used. The system administrator determines the filters to be used in the filter chains in question. In the case shown in Figure 5, of the filter chains used for filtering the response, K comprises, in sequence, the filters AA, BB, CC and DD; the filter chain L comprises the filters AA, CC and GG; and the filter chain M comprises the filters AA, CC, EE, FF and GG. Of the filter chains used for filtering the requests that come for the WAP terminal, P comprises, in sequence, the filters AA, BB, CC and FF; and R comprises the filters BB and CC. In this way, it is possible to

flexibly form five sensible filter chains with seven filters, implemented by the system.

- 5 A gateway according to the invention can be implemented programmably. The computer program product in question can be stored in a data medium, e.g. a memory, it can be transferred, and it can be run in a computer.

- 10 This paper presents the implementation and embodiments of the invention with the help of examples. A person skilled in the art will appreciate that the present invention is not restricted to details of the embodiments presented above and that the invention can also be implemented in another form without deviating from the characteristics of the invention. The presented embodiments should be regarded as illustrative but not restricting. Thus, the possibilities of implementing and using the invention are only restricted by the enclosed claims, and the various options of
15 implementing the invention as determined by the claims, including the equivalent implementations, also belong to the scope of the invention.

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Claims

1. A method for filtering messages in a gateway (11), which gateway receives and processes a first message that comes from a wireless terminal (10) and which gateway retrieves a second message from an origin server (12, 23) and supplies it to the wireless terminal, and said first and second messages belong to a specific message type of a set of message types known to the gateway, **characterised** in that the method comprises:
- 5 determining for each message type known to the gateway, a filter chain (31 – 35) that determines the filters for filtering a message that belongs to respective message type, which filters have a specific order in the filter chain; receiving a message into the gateway (11); determining the message type of the message arrived at the gateway; filtering said message in the filters (31 – 35) of the filter chain that is
- 10 defined for the message type of said message, in the order that is determined in the filter chain in question.
2. A method according to claim 1, **characterised** in that said gateway is a gateway of the WAP system (Wireless Application Protocol) and said wireless terminal is a WAP terminal.
- 20 3. A method according to claim 1, **characterised** in that said origin server is located in one of the following: Internet network; Intranet network.
- 25 4. A method according to claim 1, **characterised** in that said first message comprises a request for bringing the WAP content as a response to said first message from the origin server through the WAP gateway to the WAP terminal, and that said second message is the response in question, which comprises the requested WAP content.
- 30 5. A method according to claim 1, **characterised** in that the second message arrived at the gateway comprises the WAP content and a header as a response to the request comprised by said first message, whereupon the message type of the message is determined in the gateway by reading the message type in the content type field of the header.
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6. A method according to claim 5, **characterised** in that only the header is filtered if the determined message type of said second message is unknown to the gateway.
- 5 7. A method according to claim 1, **characterised** in that said message type of the first message is one of the following: WSP request (Wireless Session Protocol); push request.
- 10 8. A method according to claim 1, **characterised** in that said message type of the second message is one of the following: WML page; WML-script; MIME Multipart (Multipurpose Internet Mail Extensions); HTML page; Error page.
- 15 9. A method according to claim 1, **characterised** in that for each message type a filter chain is defined in a configuration file of the gateway.
- 20 10. A gateway (11), which comprises
 a specific set of filters (31 – 35) of which each filter is arranged to carry out a specific filtration, for filtering messages in the gateway (11);
 means (20 – 22, 25) for receiving and processing a first message that comes from a wireless terminal (10);
 means (20, 21, 25) for retrieving a second message from an origin server (12, 23) and for supplying it to the wireless terminal (10),
 and which said first and second messages belong to a specific message type of a set of message types known to the gateway, **characterised** in that the gateway (11) comprises:
 means (30) for determining the message type of the message that comes to the gateway (11);
 means (30) for determining a filter chain (31 – 35) for each message type, which filter chain is arranged to filter the message by directing it, in a specific order, through specific filters (31 – 35) in the filter chain, depending on the message type.
- 25 11. A computer program product that can be run by means of a computer for filtering messages in a gateway (11), which computer program product comprises:
- 30
- 35

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a computer program code for implementing a specific set of filters (31 – 35) of which each filter is arranged to carry out a specific filtration, for filtering messages in the gateway (11);

5 a computer program code (20 – 22, 25) for receiving and processing a first message that comes from a wireless terminal (10);

10 a computer program code (20, 21, 25) for retrieving a second message from an origin server (12, 23) and for supplying it to the wireless terminal (10), and which said first and second messages belong to a specific message type of a set of message types known to the gateway, **characterised** in that the computer program product (11) comprises:

a computer program code (30) for determining the message type of the message that comes to the gateway (11);

15 a computer program code (30) for determining the filter chain (31 – 35) for each message type, which filter chain is arranged to filter a message by directing it in a specific order through specific filters (31 – 35) in the filter chain, depending on the message type.

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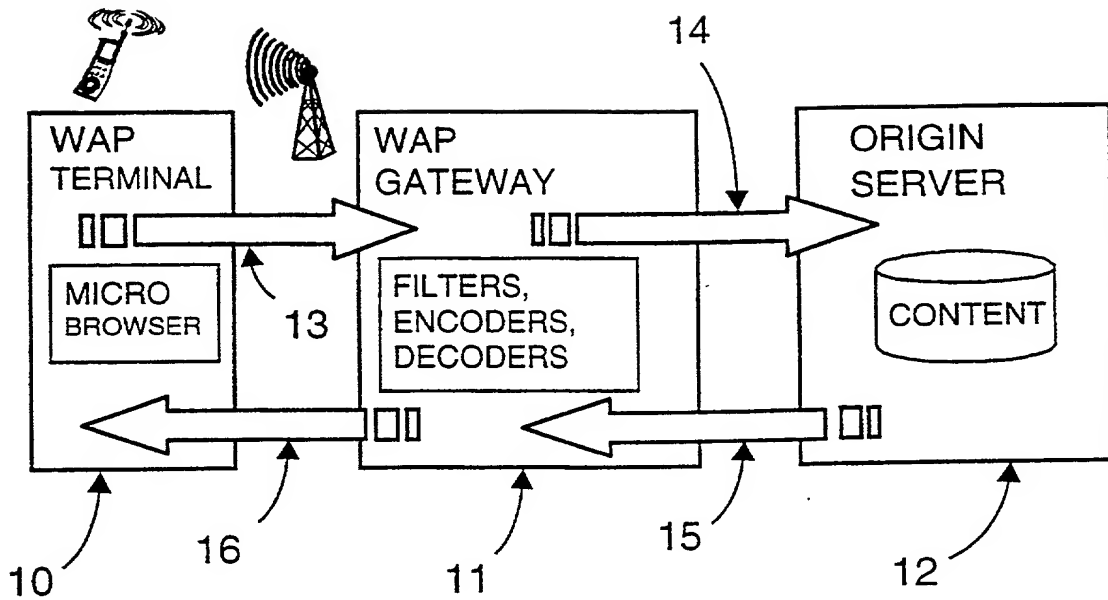


Fig. 1

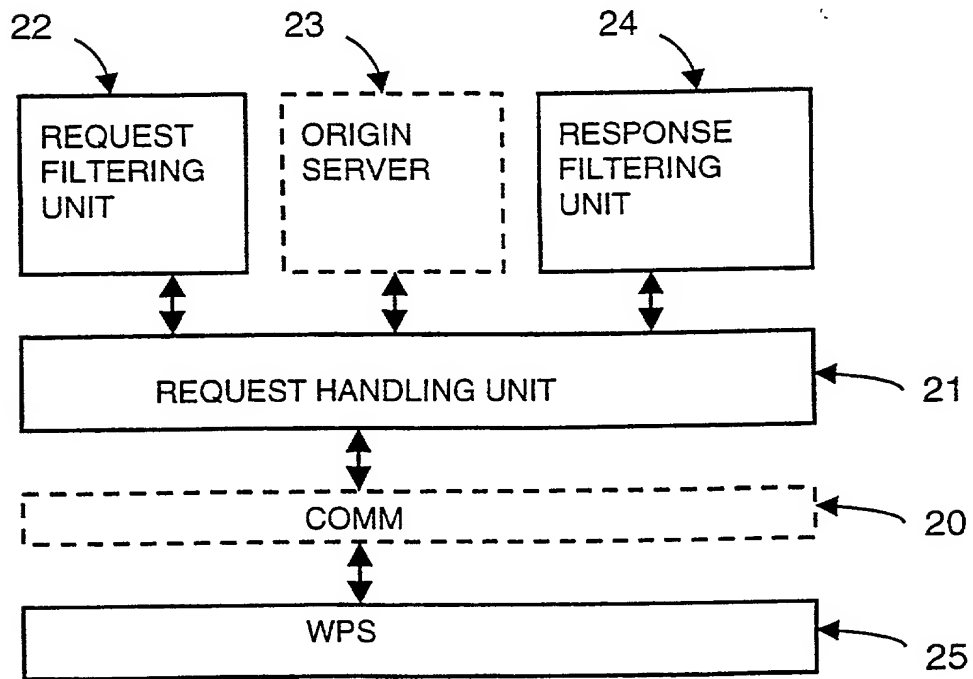


Fig. 2

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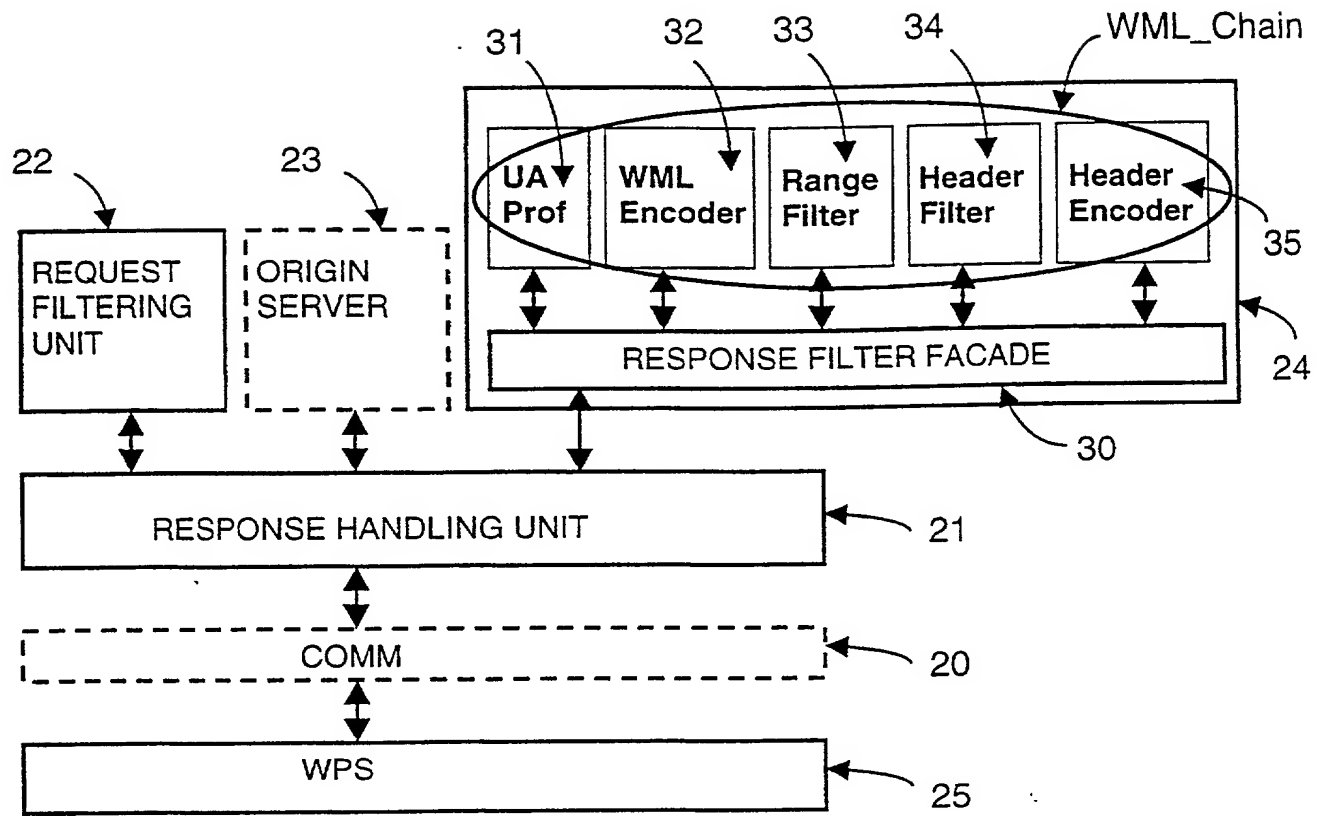


Fig. 3

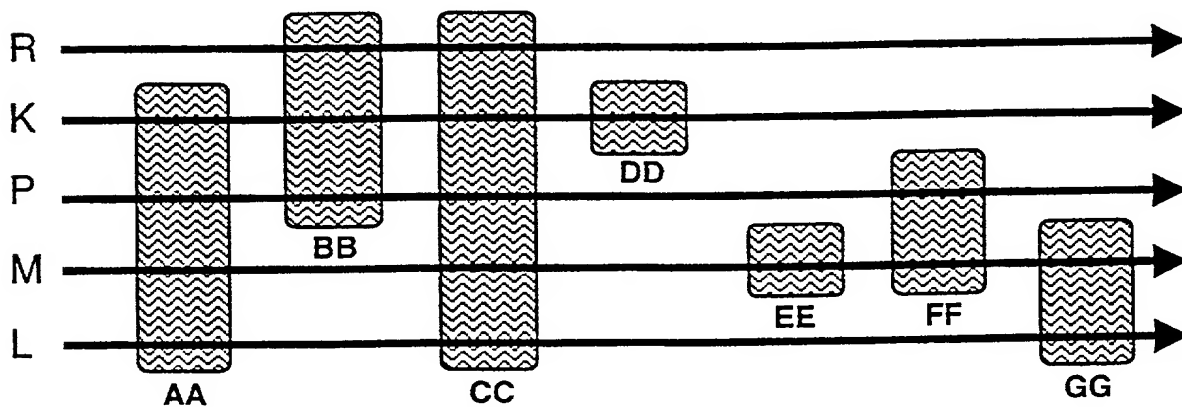


Fig. 5

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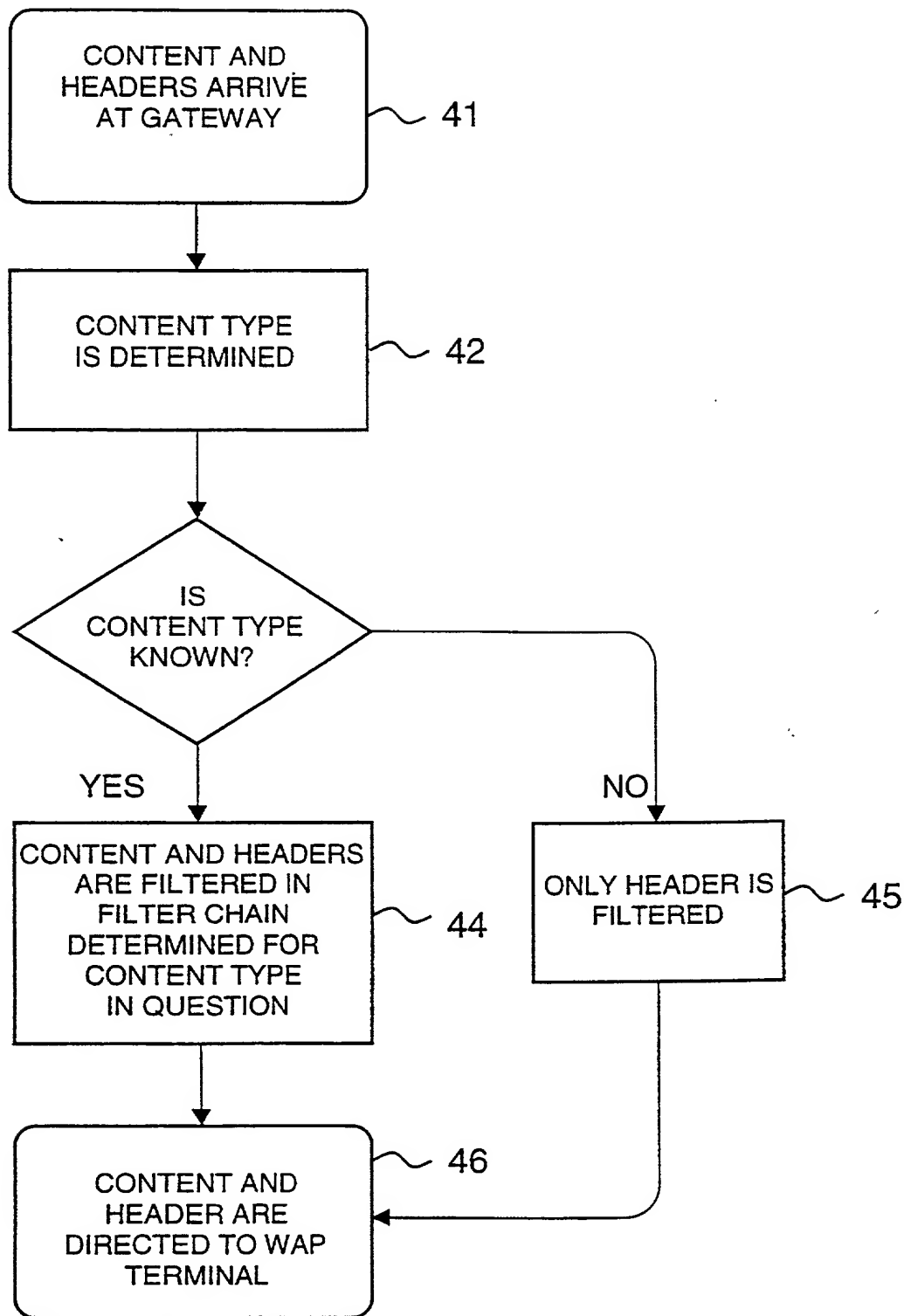


Fig. 4

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

Docket No. 876.0002.U1(US)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Content Filtering in a Gateway of a Wireless System ✓

the specification of which

(check one) ☒ is attached hereto.

_____ was filed on 21 August 2000 as U.S. Patent Application No. or PCT
International Application No. PCT/FI00/00708 ✓

_____ and/or that was amended on _____.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to the patentability of this application as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate(s) listed below and have also identified below any foreign application(s) for patent or inventor's certificate(s) having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed

_____ Yes ____ No
(Number) (Country) (Day/Mon/Year Filed)

_____ Yes ____ No
(Number) (Country) (Day/Mon/Year Filed)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the attorneys and/or agents listed

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below to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Steven Shaw	<u>39,368</u>
Brian Rivers	<u>41,270</u>
Milan Patel	<u>41,242</u>

And all Attorneys and/or Agents listed under **Customer Number: 29683** including:

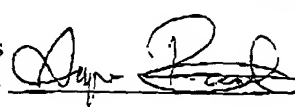
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF INVENTOR	LAST NAME <u>RAUTIAINEN</u>	FIRST NAME <u>Aapo</u>	MIDDLE INITIAL
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Inventor's Signature <u></u>		Date <u>12.2.2002</u>	